

WHAT IS CLAIMED IS:

1. A 4Pi microscope having an interferometer in which two objectives are positioned to oppose one another on different sides of an object plane, and having an optical element for coupling illuminating light into the interferometer and/or for coupling detected light out of the interferometer and for directing it into a detection beam path,
wherein a reflecting means is provided that reflects the illuminating light coupled out by the optical element back into the interferometer and/or allows the detected light coupled out by the optical element and directed into the detection beam path to pass through, and another outcoupled detected light portion that is not directed into the detection beam path to be reflected back into the interferometer.
2. The 4Pi microscope as recited in claim 1,
wherein the optical element includes at least one beam splitter, preferably a beamsplitter cube.
3. The 4Pi microscope as recited in claim 2,
wherein the reflecting means is placed directly at the beam splitter.
4. The 4Pi microscope as recited in claim 2,
wherein the reflecting means has an at least partially reflective coating.
5. The 4Pi microscope as recited in claim 2,
wherein the reflecting means is vapor-deposited onto the beam splitter.
6. The 4Pi microscope as recited in one of claims 1 through 5,
wherein the reflecting means has color-selective reflecting properties.
7. The 4Pi microscope as recited in one of claims 1 through 5,
wherein the reflecting means includes a mirror.

8. The 4Pi microscope as recited in claim 7,
wherein the mirror is convex.
9. The 4Pi microscope as recited in one of claims 1 through 8,
wherein a delay element for compensating for phase jumps is provided between the
optical element and the reflecting means.
10. The 4Pi microscope as recited in claim 9,
wherein the optical element, the reflecting means and the delay element are
combined – preferably cemented together - to form a unit.
11. The 4Pi microscope as recited in one of claims 1 through 10,
wherein the reflecting means is semireflecting.
12. The 4Pi microscope as recited in claim 11,
wherein a camera, which receives the illuminating and/or detected light passing
through the reflecting means, is provided for monitoring the adjustment.
13. The 4Pi microscope as recited in one of claims 1 through 12,
wherein a light source which produces the illuminating light is provided; and an
optical diode - preferably including a Faraday rotator - is provided between the
light source and the optical element.